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The Internationalisation of the Pakistani Stock Market: An Empirical Investigation

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INTRODUCTION

A recent major development in international finance has been the growing interest of the portfolio managers in emerging stock markets. The interest in the emerging markets has been accelerated by global trends towards the opening up of economies and financial markets, the free flow of capital and the privatisation of financial institutions. The integration of emerging markets globally has been hindered so far as, besides other several factors, participating in emerging securities markets has posed serious problems for international investors. "These markets lack the depth, regulatory framework, and structural safeguards that characterise equity markets in the United States and in a few industrial countries," [Medewitz *et al.* (1991)]. A peculiar risk of investing in the emerging markets, besides the currency, political and investment risk, is the "risk arising out of the development stage of emerging markets," [Errunza and Losq (1987)]. Compounding the difficulties for the international investor is the lack of information pertinent for making investment decisions. A study of emerging markets, therefore, becomes important in shedding light on the economic and institutional characteristics of these markets.

Academicians like practitioners have been investigating the benefits of international diversification and the related issue of the integration of global security markets. The major attraction of forming international portfolios lies in the potential for risk reduction through diversification of unsystematic risk. The gains from international diversification have been well documented in empirical studies such as by Levy and Sarnat (1970); Solnik (1974); Lessard (1974, 1976) and Barclay *et al.* (1990). The lower the correlation among the asset returns internationally the higher is the reduction in risk. Emerging markets offer assets with relatively low levels of correlations reflecting the low levels of economic integration and substantially different socio-economic structures. The correlations in asset returns depend on the degree of the integration of capital markets and reflect the extent to which price changes and volatility spills over across international markets; see for example, Hamao *et al.* (1990).

The main equity market in Pakistan, the Karachi Stock Exchange, attracted international attention recently by registering a gain of 160 percent in 1991,

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ranking third among the emerging markets tracked by the IFC. The market was bullish following measures taken to liberalise the economy, relaxation of foreign exchange controls, and easing of regulation on repatriation of profits, investment and operation of financial institutions.

The focus of this study is the relationship between prices in the Pakistan equities markets and major regional and international equity markets. We are interested in (1) the extent to which security price changes internationally influence the price changes in Pakistani markets, and (2) whether changes in price volatility in international markets affect the volatility in the Pakistani stock market. In other words we study the transmission of the conditional first and second moments in equity prices from major international markets to the Pakistani market.

DATA

The countries selected for studying the relationship to the Pakistani stock market are Australia, India, Japan, Korea, U.K. and the U.S.A. Except for India and Korea, the selected countries are major trading partners of Pakistan, besides being major capital markets. India and Korea, however, represent strong emerging markets in the region. The data consists of monthly share price indices reported in the International Financial Statistics (IFS) of the International Monetary Fund. The sample period is from July 1960 to June 1992, although in the case of India and Korea the series start from March 1984 and March 1978 respectively. In Table 1 Panels A and B provide a financial profile of the stock markets of the selected countries. As is evident from Panel A of Table 1 the size of the Pakistani market is very small compared not only to the developed markets such as the U.S. and the U.K., but also to India, and Korea, the other emerging markets in the region. This disparity is even more prominent in terms of the value of the securities traded, indicating that the Pakistani market is not only very small but also comparatively inactive. Panel B of Table 1 gives comparative statistics of historical returns over the past return for the period from February 1984 to May 1992. The mean and the standard deviation of the monthly returns on the Pakistan share-index have been 0.78 percent and 3.73 percent respectively which are close to the mean return and standard deviation observed on the developed and the emerging markets except for India which has a twice as large mean and standard deviation. The return on the Pakistani and the U.K. indices showed positive skewness. For all indices except India the coefficient of Kurtosis is noticeably different than 3.0 indicating non-normality of the return distribution. Table 1, Panel C gives contemporaneous correlations among the equity indices. As expected, the correlations between the developed markets are much higher than the correlations among the emerging markets, as well as correlations between the emerging markets and the developed markets.

The IFS share-price indices relate to common shares of companies traded on national stock exchanges and are in general base-weighted arithmetic averages,

Table 1

Panel A: Profile of Equity Markets

(Millions of U.S. Dollars)

Country	Market Capitalisation	Value Traded	Listed Companies (No.)
Australia	144,867	46,835	957
Japan	3,130,863	995,939	2,107
U.K.	1,003,184	317,866	1,915
U.S.A.	4,180,210	2,254,983	6,742
India	47,730	24,295	6,500
Korea	96,373	85,464	686
Pakistan	7,326	645	542

Panel B: Descriptive Statistics

Sample Period: 1984:2 to 1992:5

	MEAN	STD DEV	MINIMUM	MAXIMUM	SKEWNESS	KURTOSIS
RAUS	0.0064	0.0487	–0.3238	0.1402	–0.9262	5.3948
RJAP	0.0078	0.0449	–0.2778	0.2692	–0.4475	6.7986
RPAK	0.0078	0.0373	–0.1096	0.2292	1.6265	7.8277
RUSA	0.0061	0.0362	–0.1331	0.1205	–0.5111	1.8035
RIND	0.0247	0.0785	–0.2396	0.3505	0.5166	3.6438
RKOR	0.0099	0.0552	–0.1803	0.1856	0.3276	1.2742
RUK	0.0084	0.0508	–0.2273	0.4386	1.2075	14.2635

Correlation Matrix

	RAUS	RJAP	RUK	RUSA	RIND	RKOR	RPAK
RAUS	1.0000						
RJAP	0.3767	1.0000					
RUK	0.5927	0.4419	1.0000				
RUSA	0.5988	0.4496	0.6639	1.0000			
RIND	0.0748	–0.3251	–0.0416	–0.0486	1.0000		
RKOR	0.1009	0.3841	0.3426	0.2716	–0.0534	1.0000	
RPAK	0.0713	–0.1526	–0.0823	–0.0852	0.0472	–0.0768	1.0000

Source: International Finance Corporation (1992).

weighted by market values of outstanding shares. Monthly indices are generally simple arithmetic averages of the daily or weekly indices. The variable of interest is the change in the stock indices computed as the percentage change in the value of the index ($I_{i,t}$), defined here as return ($R_{i,t}$); formally, $R_{i,t} = I_{i,t}/I_{i,t-1} - 1$. This measure

of return does not include the dividend yield and underestimates the true return. The dividend yields are, however, small and rather constant and, therefore, are unlikely to affect the results of this research. The method of computation of monthly indices as averages is likely to induce spurious autocorrelation to changes in the value of the indices which needs to be corrected. On the other hand, use of monthly data is helpful in studying longer term relationships and circumventing the problems related to non-synchronous trading likely to be prominent in thinly traded emerging markets, week of the day effects and possibly informationally inefficient markets. These factors are also likely to induce serial correlation in returns.

METHODOLOGY

In order to investigate the relationship of mean stock return and volatility in the selected countries to the mean stock return and volatility in the Pakistani stock market we employ models of conditional variances using the Generalised Autoregressive Conditional Heteroscedasticity (GARCH) formulation. The Autoregressive Conditional Heteroscedasticity (ARCH) model introduced by Engle (1982) allows the variance of the error term to vary over time, in contrast to the standard time series regression models which assume a constant variance. Bollerslev (1986) generalised the ARCH process by allowing for a lag structure for the variance. GARCH models have been found to be valuable in modelling the time series behaviour of stock-returns. [See for example, Baillie and DeGennaro (1990); Najand and Rahman (1991); Akgiray (1989); French *et al.* (1987) and Koutmos *et al.* (1993), among others].

Bollerslev (1986) allows the conditional variance to be a function of prior periods errors squared as well as of its past conditional variances. The general form of the GARCH (p,q) is the following:

$$Y_t = X_t \beta + \epsilon_t$$

$$\epsilon_t \mid \Phi_{t-1} \sim N(0,h_t)$$

$$h_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i \epsilon^2_{t-1} + \sum_{i=1}^{p} \beta_i h_{t-i} \quad \ldots \quad \ldots \quad \ldots \quad (1)$$

The dependent variable is modelled as a linear function of independent variables (X_t) with β a vector of unknown parameters. The error term ϵ_t has a variance h which in turn is a linear function of past q squared errors and p past conditional variances (as well as possible exogenous variables). If, in addition, the dependent variable is also made a function of the conditional variance, the model is known as the GARCH-M which was introduced by Engle, Lilien and Robin. The stability of variance process requires that the coefficients of the lagged errors and lagged conditional variances must sum to less than one.

The parameters are estimated using non-linear estimation techniques based on the Berndt-Hall-Hall-Hausman algorithm, which involves recursive calculation of the variance, h_t. In a GARCH (p,q) model the order of p and q can be identified by following Box and Jenkins identification techniques to the time series and examining the autocorrelations and partial autocorrelations for the squared residuals. The primary specification test for a lack of serial correlation in the residuals is Ljung-Box statistics which is asymptotically chi-square distributed. Likelihood ratio can be employed to test the descriptive validity of the model.

RESULTS

Table 2, Panel A reports the serial correlations for each of the markets for up to 6 lags. All series show high and significant first order serial correlation. The correlations coefficient generally are not very high and significant beyond the first lag, exceptions being for Australia at lag(2) and for U.K. at lag(6). Following the Box-Jenkins method, GARCH (1,1) was considered as an adequate model as the autocorrelations and partial autocorrelations from the model cut off after one period lag. (Examination of autocorrelations and partial-autocorrelations up to 20 lags not reported here supports this assumption.) It may be noted here that under the Efficient Markets Hypothesis in an informationally efficient market serial correlation should be absent. The presence of autocorrelation here, however, is not an evidence against the efficiency of the markets but rather is likely to be an artifact of the computation of the monthly indices as weekly or daily averages.

In order to examine the appropriateness of the GARCH specification for the markets under study we employ a univariate GARCH (1,1) model to each of the countries in the following form:

$$
\begin{aligned}
R_{i,t} &= c + \delta R_{i,t-1} + \epsilon_t \\
\epsilon_t \mid \Phi_{t-1} &\sim N(0,h_t) \\
h_t &= \alpha_0 + \alpha_1 \epsilon^2_{t-1} + \beta h_{t-1} \qquad \ldots \qquad \ldots \qquad \ldots \qquad (2)
\end{aligned}
$$

where h_t is the conditional variance of the stock index return $R_{i,t}$ for country i. One period lagged returns are included on the right-hand side to take into account the autocorrelation observed in the return series. Table 2 Panel B shows the results of our initial GARCH estimation. The t-statistics for the GARCH(1,1) model parameters are significant for all of the countries. None of the Ljung-Box statistics for the first 12 normalised residuals are significant at conventional levels. Although the coefficient of Kurtosis for normalised residuals are of some concern, in general, it appears that the model is quite appropriate. GARCH-M specifications for each market were also estimated. The results, however, Indicated that the simpler model was more appropriate.

The model employed to study the relationship of foreign stock markets to the Pakistani market has the following form:

Table 2

Panel A: Autocorrelations Coefficients (Standard Errors in Parenthesis)

	Period	OBS No.	LAG1	LAG2	LAG3	LAG4	LAG5	LAG6
AUSTRALIA	60:8-92:6	383	0.3050	–0.1880	0.0282	–0.0582	–0.0427	–0.0078
			(0.0511)	(0.0556)	0.0557	(0.0557)	(0.0559)	(0.0559)
JAPAN	60:8-92:6	383	0.1900	0.0790	–0.0237	0.0097	–0.0137	0.0040
			(0.0511)	(0.0529)	(0.0532)	(0.0533)	(0.0533)	(0.0533)
U.K.	60:8-92:5	382	0.3460	–0.0211	0.0371	0.0536	–0.1120	–0.1250
			(0.0512)	(0.0570)	(0.0570)	(0.0570)	(0.0572)	(0.0577)
U.S.A.	60:8-92:6	383	0.2810	–0.0114	0.0078	0.0275	0.0355	–0.0757
			(0.0511)	(0.0550)	(0.0550)	(0.0550)	(0.0550)	(0.0551)
INDIA	84:2-92:6	101	0.2800	–0.0932	–0.1990	–0.1170	0.0451	0.1210
			(0.0995)	(0.1070)	(0.1080)	(0.1110)	(0.1130)	(0.1130)
KOREA	78:2-92:6	173	0.2540	0.0990	0.0046	0.118	0.1040	0.1200
			(0.0760)	(0.0808)	(0.0815)	(0.0815)	(0.0825)	(0.0832)
PAKISTAN	60:8-92:6	383	0.2200	0.0413	0.0429	0.1160	0.1560	0.0912
			(0.0511)	(0.0535)	(0.0536)	(0.0537)	(0.0543)	(0.0555)

Continued–

Table 2 – (*Continued*)

Panel B: Estimation of GARCH(1,1) Model

$$\text{Model: } R_{i,t} = c + \delta R_{i,t-1} + \epsilon_t ; \epsilon_t \mid \Phi_{t-1} \sim N(0,h_t)$$

$$h_t = \alpha_0 + \alpha_1 \epsilon^2_{t-1} + \beta h_{t-1}$$

	Australia		India		Japan		Korea		U.K.		U.S.A.		Pakistan	
Sample Period:	1960:8 to 1992:6		1984:3 to 1992:6		1960:8 to 1992:6		1978:3 to 1992:6		1960:8 to 1992:5		1960:8 to 1992:6		1960:8 to 1992:6	
No of Observations:	383		100		383		172		383		383		383	
Parameter	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-state	Estimate	*t*-stat
C	.0042	2.4533*	.0150	2.2234*	.0073	4.5378**	.0054	1.3279	.0073	3.6161**	.0055	3.1767**	.0044	2.4951*
RFOR(−1)	.2599	5.8403**	.1906	2.1464*	.3072	6.3046**	.2489	3.0858**	.2931	5.7269**	.2461	4.1272**	.1841	2.7896**
ALPHA0	.0001	1.6187	.0026	4.2872**	.0001	2.6163**	.0003	1.8302	.0013	11.9409**	.0010	13.1093**	.00007	2.6646**
ALPHA1	.2682	4.1883**	.6035	2.7058**	.3163	6.1320**	.1757	2.4475*	.3735	5.9695**	.1496	2.4358*	.1295	5.3902**
BETA1	.6955	8.8463**	.0000	.0000	.6432	10.1183**	.7494	9.6960**	.0000	.0000	.0000	.0000	.8272	18.8728**
For Normalised Residuals														
SKEWNESS		−0.0550		0.4270		−0.2874		0.0831		−0.0135		−0.2029		1.4096
KURTOSIS		0.3575		0.5940		1.0730		1.19489		0.7415		1.3250		5.8127
Ljung Box(12)		16.1		15.5		7.43		10.1		22.0		16.6		24.3
LR(3) for H_0:$\delta = \alpha_1 = \beta = 0$		97.3		51.9		126.1		14.9		123.3		35.9		80.3

t-statistics: *significant @ 5 percent, ** significant @ 1 percent.

$\chi^2(3)$ critical values: 6.25 (10 percent), 7.81 (5 percent), 11.35 (1 percent): $\chi^2(5)$ critical values: 9.24 (10 percent), 11.07 (5 percent), 15.09 (1percent): $\chi^2(12)$ critical values: 18.55 (10 percent), 21.03 (5 percent), 26.22 (1 percent).

$$R_{P,t} = c + \delta R_{Pt-1} + \theta R_{F,t} + \epsilon_t$$

$$\epsilon_t \mid \Phi_{t-1} \sim N(0,h_t)$$

$$h_t = \alpha_0 + \alpha_1 \epsilon^2_{t-1} + \beta h_{t-1} + \phi V_{F,t} \quad \ldots \quad \ldots \quad \ldots \quad (3)$$

The return on the Pakistan stock market ($R_{P,t}$) is a function of its one period past value ($R_{P,t-1}$) and return on foreign stock markets ($R_{F,t}$) and an error term (ϵ_t). The error term is conditional on the information set Φ_{t-1} at time $t-1$. The variance of the error term (h_t) is a function of past errors squared, past conditional variance and an exogenous variable, $V_{F,t}$, which captures the conditional volatility in foreign stock markets. The variable $V_{F,t}$ is computed for each of the foreign markets as the most recent squared residual derived from model (2) and can be regarded as "volatility surprise" in the international markets.

The study period is divided into three sub-periods; (i) from August 1960 to December 1971, (ii) from June 1972 to July 1977, and (iii) from August 1977 to June 1992. Table 3 shows the results for the full period, August 1960 to June 1992, in Panel A and for the three sub-periods in Panels B, C and D. The main variables of interest are $R_{F,t}$ representing returns on the foreign stock markets, and $R_{F,t}$, representing the 'volatility surprise' in the foreign markets. For the full study period (Panel A) and for the first two sub-periods (Panels B and C) the coefficients of $V_{F,t}$, (RFOR) for all countries except Australia for the first sub-period, September 1960 to December 1971, are not significant. The coefficients of $V_{F,t}$ (PHI_V) are also not significant for all countries as well, except for the U.S.A. for the full period. Therefore, the results indicate that there is no evidence of spillover effects in conditional means or variances from the international markets to the Pakistani stock market, except for the U.S.A for the full period under study and for Australia in the first sub-period. These coefficients for the conditional volatility and mean are significant at the 5 percent significance level. For the third sub-period, August 1977 through June 1992, the coefficients for volatility surprise (PHI_V) are significant for Japan and Korea. None of the coefficients for the conditional mean are significant. For the other four markets these coefficients could not be estimated due to the singularity of data during the estimation procedure. The evidence, therefore, indicates that conditional volatility in the Japanese and Korean markets is being transmitted to the Pakistani market.

We also converted the stock returns into U.S dollar equivalent returns using monthly quotes for local currency per U.S. dollar (S_t); return in U.S. dollar = (S_{t-1} /S_t) (1+R_t)−1. The results from estimating models 1 and 2 using dollar converted returns (not reported here) were similar to the results reported here using only local currency returns.

CONCLUSION

In this study we have documented the transmission of changes in stock returns and their volatility from international markets to the Pakistani stock market.

Table 3

Estimation of GARCH(1,1)Model

Model: $R_{P,t} = c + \delta R_{P,t-1} + \theta R_{F,t} + \epsilon_t \; ; \epsilon_t \mid \Phi_{t-1} \sim N(0,h_t)$

$$h_t = \alpha_0 + \alpha_1 \epsilon^2_{t-1} + \beta h_{t-1} + \phi V_{F,t}$$

Panel A: Period 1960:9 to 1992:6; No. of Observations = 382

	Australia		Japan		U.K.		U.S.A.	
Parameter	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat
C	.0039	2.2832*	.0040	2.1311*	.0040	2.2825*	.0039	2.2289*
RFOR	.0686	1.7637	.0500	1.2738	.0474	1.3161	.0522	.8782
RPAK(−1)	.1829	2.8019**	.1826	2.7901**	.1722	2.5946**	.1799	2.8013**
ALPHA0	.0001	2.1891*	.0001	2.5454*	.0001	2.3078*	.00004	1.3066
ALPHA1	.1373	4.7047**	.1296	5.4584**	.1342	5.1569**	.1309	5.4772**
BETA1	.8156	15.2801**	.8297	18.8577**	.8211	17.4968**	.8322	18.7633**
PHI_V	.0075	.6397	.0000	.0000	.0026	.3015	.0197	2.0053*
LR(5) for $\delta = \theta = \alpha_1 = \beta = \phi = 0$	88.5		86.2		87.9		87.7	
For Normalised Residuals								
SKEWNESS		1.0499		1.0880		1.4625		2.4687
KURTOSIS		4.0146		3.9752		6.1215		17.4829
Ljung Box(12)		15.5		27.1		25.7		23.1

Panel B: Period 1960:9 to 1971:12; No. of Observations = 136

C	.0001	.0748	−.0003	−.1368	.0001	.0674	−.0003	−.1686
RFOR	.1257	2.1438*	.0779	1.8123	.0281	.6179	.0858	1.3907
RPAK(−1)	.1861	2.0094*	.1645	1.8174	.1578	1.7255	.1658	1.8228
ALPHA0	.000003	.0972	.00003	.7724	.00003	.8919	.00003	.8928
ALPHA1	.1331	1.7989	.1666	1.5855	.1575	1.6740	.1613	1.7781
BETA1	.8281	8.2926**	.7938	6.6167**	.8012	7.1964**	.8015	7.6808**
PHI_V	.0238	1.3784	.0012	.2236	.0000	.0000	.0000	.0000
LR(5) for $\delta = \theta = \alpha_1 = \beta = \phi = 0$	18.1		16.0		11.9		13.9	
For Normalized Residuals:								
SKEWNESS		0.1971		0.2515		0.1262		0.1517
KURTOSIS		−0.3438		−0.1485		−0.4012		−0.3839
Ljung Box(12)		17.4		17.0		16.7		17.1

Panel C: Period 1972:6 to 1977:7; No. of Observations = 62

C	.0079	1.2698	.0087	1.4394	.0069	1.1268	.0077	1.1886
RFOR	.0822	.6327	−.0617	−.3266	.0644	.6249	.2680	1.5597
RPAK(−1)	.1369	.9409	.1767	1.1333	.1594	1.1373	.1772	1.2955
ALPHA0	.0013	4.4666**	.0011	1.9507	.0016	6.3348**	.0013	2.5527*
ALPHA1	.0000	.0000	.0000	.0000	.0000	.0000	.0235	.1365
BETA1	.0000	.0000	.0000	.0000	.0000	.0000	.0000	.0000
PHI_V	.1200	.7266	.5431	1.5306	.0144	.2899	.1675	.6217
LR(5) for $\delta = \theta = \alpha_1 = \beta = \phi = 0$	4.7		3.9		3.0		6.4	
For Normalized Residuals								
SKEWNESS		0.9839		0.7895		0.8637		0.5396
KURTOSIS		2.3651		0.9282		1.9340		1.1090
Ljung Box(12)		8.92		9.24		9.24		7.94

Continued–

Table 3 – (*Continued*)

Panel D: Period from 1977:8 to 1992:6

	Australia		Japan		U.K.		U.S.A.		India		Korea	
Sample Period:	1977:8 to 1992:6		1977:8 to 1992:6		1977:8 to 1992:6		1977:8 to 1992:6		1984:3 to 1992:6		1978:3 to 1992:6	
No of Observations:	179		179		178		179		100		172	
Parameter	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat	Estimate	*t*-stat
C	.0077	2.0732*	.0106	2.7385**	.0079	2.0864*	.0085	2.2763*	.0087	1.3690**	.0101	2.5241*
RFOR	.0562	.8078	−.0721	−.5751	.0429	.5375	−.0138	−.1464	.0113	.0940	−.0066	−.0838
RPAK(−1)	.2013	1.9216	.1886	2.2320*	.1914	1.7578	.1910	1.7934	.1510	.8352*	.1789	1.8036
ALPHA0	.0002	2.1941*	.0010	9.3065**	.0001	2.1493*	.0001	2.2200*	.0002	1.5660**	.0011	8.3891**
ALPHA1	.1563	3.3027*	.0535	.9406	.1515	3.5450**	.1500	3.5483**	.1841	1.7422	.0879	1.3892
BETA1	.7672	9.1664*	.0000	.0000	.7808	9.8775**	.7761	10.1481**	.7301	4.5189**	.0000	.0000
PHI_V	.0000	.0000	.4821	4.7338**	.0000	.0000	.0000	.0000	.0000	.0000	.1962	4.8619**
LR(5) for $\delta = \theta = \alpha_1 = \beta = \phi = 0$	42.7		16.8		42.8		41.2		27.3		10.6	
For Normalised Residuals:												
SKEWNESS	1.5077		1.3739		1.54385		1.5187		1.8477		1.4859	
KURTOSIS	4.9603		5.8464		5.06525		4.8676		6.2031		6.2935	
Ljung Box(12)	17.8		15.3		18.0		17.5		12.7		20.1	

t-statistics: * Significant @ 5 percent, ** significant @ 1 percent.

$\chi^2(3)$ critical values: 6.25 (10 percent), 7.81 (5 percent), 11.35 (1 percent).

$\chi^2(5)$ critical values: 9.24 (10 percent), 11.07 (5 percent), 15.09 (1 percent).

$\chi^2(12)$ critical values: 18.55 (10 percent), 21.03 (5 percent), 26.22 (1 percent).

We find that a GARCH (1,1) model can adequately represent the monthly stock returns in the Pakistani market just as well as the other markets under study. We find empirical evidence that volatility in the Japanese and the Korean markets over the period August 1977 to June 1992, and in the U.S.A. market for the period from July 1960 to August 1992 have affected the Pakistani market. This finding is consistent with research on international spillover effects such as by Eun and Shim (1989) and Hamao *et al.* (1990). Except for Australia in the first sub-period, 9-1960 to 12-1972 we do not find evidence to reject the null hypothesis of no price change effect for the rest of the countries or other earlier periods. This suggests that overall unexpected price changes in the foreign markets are not associated with significant changes in the conditional mean of the domestic market stock returns. The result is consistent with the hypothesis of informational efficiency in financial markets internationally. The results indicate that in the recent period there is evidence of integration of the Pakistani market with the stock markets in Japan and Korea. The evidence in favour of integration with the other markets is lacking (for Australia, U.K. and India) or weak (for U.S.). It is suggested that regional stock markets may be exerting a greater influence on the Pakistani stock market than the more distant markets. A low degree of integration may also indicate that the Pakistani stock market can offer opportunities to global funds for risk reduction through international diversification.

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Comments on
"The Internationalisation of the Pakistani Stock Market: An Empirical Investigation"

The paper by Dr Uppal on "The Internationalisation of the Pakistani Stock Market: An Empirical Investigation" is very interesting and well timed.

This paper is an important contribution to the growing area of research on the topic in Pakistan. In the light of the recent government policies, the role of the stock market in Pakistan has become very demanding particularly for the mobilisation of capital in the country. Moreover, a lot of issues regarding its performances and operation are still on the research list, unanswered and requiring attention.

To my knowledge this study is the first of its kind to find out the relationship between prices in the Pakistani equity market and major regional and international equity markets. This paper attempts to determine the extent to which security prices change internationally, influencing the price change in Pakistan in turn. In this paper Dr Uppal has used the most recent and most valuable standard technique to test his hypothesis. For the appropriateness of the method he has also used the statistical test required.

The results of the study is not surprising given the various characteristics of the capital market in Pakistan. The stock market has been too depressed and it only picked up in the last two years. Based on short-term gains we cannot expect much of the internationalisation linkage with the Pakistani stock market. The author has also accepted in the paper that the Pakistani stock market is small compared to other markets mentioned in this study. In addition, the Pakistani stock market has been comparatively inactive and provided limited diversification and lower level of market capitalisation. As only 25 to 30 percent of the shares are floated, part is taken by financial institutions and significant share are held with few important families. Insider trading is very common. The political changes in this country have also shattered the confidence of the investors. In my view before making judgement and consider the usefulness of the linkages mentioned in this paper, these issues need to be analysed first.

Now a few minor points, as Dr Uppal has compared the relationship for different periods, the criteria for choosing different periods needs to be clarified, as it is very important. As one of the criteria used for choosing countries for comparison was trading but for Pakistan quota restrictions is a crucial instrument particularly when trading with developed countries and somehow the same is likely to affect the sectoral performances and variation in stock prices etc. as recently observed in the case of textiles.

To strengthen the arguments some other parameters may also be used to explain the linkage or no linkage in various markets such as the extent of trading relationships, capital flows, foreign investments, interest rates, exchange rates and effective returns etc. (as different tax structures are followed in different countries). For example, as the author has mentioned that Korea is neither a great trading partner nor a major capital market but the effect is still transmitted to the Pakistani market, needed explanation. One other minor thing the presence of autocorrelation is not evidence against the efficiency of the capital market but rather is likely to be an artifact of the computation of monthly indices as weekly or daily averages need further reference and explanation.

The concluding remarks made by the author that regional stock markets may be exerting a greater influence for the Pakistani stock market than the more distant markets may further be tested with other markets such as those in Malaysia, and Taiwan.

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